Chapter 4.0 Process Information

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4.0 PROCESS INFORMATION

4.1 CONTAINERS

The following sections describe the types of containers stored at the 331-C Storage Unit.

4.1.1 Description of Containers

Containers of hazardous waste entering the 331-C Storage Unit are inspected before being accepted for storage. Generating units are responsible for placing the materials in adequate containers. Waste not in its original container must be placed in containers that are compatible with the materials to be stored.

Containers in poor condition or inadequate for storage are not accepted at the unit. If transport is by unit personnel, such containers are not accepted for transport. Refer to Section 6.4.1 for inspection before transport performed by unit personnel. "Container in poor condition or inadequate for storage" means a container that is not intact or undamaged and not securely sealed to prevent leakage during storage, transport and ultimate offsite disposal. Examples of acceptable packaging include laboratory reagent bottles, DOT containers, spray cans, sealed ampoules with septums, paint cans, leaking containers that have been overpacked, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage, using the criteria of WAC 173-303-190 and professional judgment whether the packaging may leak during handling, storage and/or disposal.

All flammable liquid waste is stored in compatible DOT-specified shipping containers and/or in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable storage cabinets. Solid chemicals are stored on shelving in specifically designated areas based on the DOT hazard classification.

All containers utilized for offsite transport of dangerous waste at the unit are selected and shall comply with all applicable criteria found in WAC 173-303-190.

4.1.2 Container Management Practices

Management practices for containers of dangerous waste are in place at the 331-C Storage Unit to verify the safe receipt, handling, preparation for transport, and transportation of waste. These practices and procedures are summarized below.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections is in place to verify container integrity, check for proper storage location, prevent capacity overrun, etc. These inspection activities are detailed in Chapter 6.0, Section 6.2.

Container Handling. All unit staff is instructed in proper container handling safeguards as part of their training. Containers are always kept closed except when adding or removing waste, in accordance with WAC 173-303-630(5)(a).

Containers are not opened, handled or stored in a manner that would cause the container to leak or rupture. Small containers (five gallons or less capacity) are stored on shelving or in approved flammable liquid storage lockers (if appropriate). Containers over five gallons capacity are stored on the floor of the appropriate storage cell, in cabinets, or stored in the appropriate containment area on the bay floor. Unnecessary handling not required for redistribution or preparation for transport and disposal by either lab packing or bulking is minimized. For manual movement, hand trucks specifically designed for drum

handling are used. When using the forklift, a drum hoist is used or the drums are carried on pallets. Drums are never carried on the forks or "speared" by slipping the forks under the chime. When waste handling operations are conducted, at least two persons are present in the unit.

Lab Packing. One of the major functions of the 331-C Storage Unit is the preparation of lab packs for offsite recycling, treatment and/or disposal of small quantity lab waste generated by DOE-RL/PNNL activities.

Lab packs are prepared in compliance with WAC 173-303-161, 49 CFR 173.12, other applicable regulations, and requirements of the planned receiving facility (recycler, treatment facility, or disposal facility). Requirements affecting preparation of lab packs might include types of absorbent materials to be used (e.g., no vermiculite).

Lab packs are prepared in the bay area or in the storage cell containing the hazard class(es) to be placed in the lab pack.

Partial and completed lab packs are closed, labeled, and the contents list documented. Lab packs are stored in the cell from which the containers inside were drawn, or in the bay area if appropriate.

Unit personnel wear appropriate protective clothing while handling containers being placed in lab packs. At a minimum this includes lab coats or long sleeved shirt, long pants, safety glasses or other protective eyewear, and chemical resistant gloves. More stringent requirements, including use of respiratory protection, may be imposed if appropriate.

Bulking. In order to promote greater recycling or treatment of waste and reduce land disposal, some liquid wastes are "bulked" into larger containers, typically 30- or 55-gallon closed head drums. Bulking is the commingling of small containers of compatible waste into one container. Appropriate respiratory protection will be used when the bulking of flammable liquids or toxics is performed. Bulking of nonvolatile, low hazard waste such as saline solutions or ethylene glycol may be done within the containment areas of the appropriate storage cell or bay area.

Compatibility of waste to be bulked is determined using the information from generating unit designation information, process knowledge, laboratory analyses, and/or by compatibility determinations.

Glass containers emptied (as defined by WAC 173-303-160(2)) as a result of bulking activities are usually crushed onsite by an electric glass crusher, which mounts on a 55-gallon drum or managed as solid waste in accordance with WAC 173-303-160(3). If an emptied glass container held acutely hazardous waste, as defined by WAC 173-303-040(2), the container is rinsed at least three times with an appropriate cleaner or solvent before being destroyed. The rinsates are managed as dangerous waste.

Once bulking is complete, the bulk container is closed, labeled, and the contents list documented. Containers of bulked waste are stored in the cell from which the containers inside were drawn, or in Cell 7 if appropriate. If incompatible wastes are stored in Cell 7, they are kept in individual secondary containment systems if in bulk drum form.

Unit personnel wear appropriate protective clothing while bulking containerized liquid waste. At a minimum, this includes coveralls, or long sleeved shirt, long pants, disposable splash-resistant apron, eye protection, and chemical resistant gloves. More stringent requirements, including use of respiratory protection, may be imposed if appropriate.

4.1.3 Container Labeling

As required by WAC 173-303-630, all containers of dangerous waste are marked and/or labeled to describe the contents of the container and the major hazards of the waste. Containers are also marked with a unique identifying number assigned by the unit's computerized waste tracking system.

4.1.4 Containment Requirements for Storing Containers

4.1.4.1 Secondary Containment System Design

Several design features have been engineered into the construction of the 331-C Storage Unit as added safeguards for containment of dangerous waste spills or leaks. The following subsections comment briefly on each of the design features.

4.1.4.1.1 System Design

The facility is covered by a roof that is maintained to prevent intrusion of rainwater into areas where hazardous waste is stored.

The base of the facility consists of a 6-inch reinforced, poured concrete slab. All exposed surfaces were finished with a smooth troweled surface and painted with a chemical resistant epoxy based coating. All edges and corners were sealed with a bead of sealant.

The concrete floors in each bay storage cell are sealed and bermed using angle iron and have containment trenches at the entrances to these cells. These trenches are isolated from each other to prevent interaction, reactions, or offsite migration of spilled materials. This provides protection even during simultaneous spills.

The condition of the floor coating is inspected weekly per Chapter 6.0, and repairs are made as needed. Immediate repairs are indicated whenever the coating is observed to have been chipped, bubbled up, scraped, or otherwise damaged in a manner that would significantly impact the capability of the coating to contain spilled materials. Minor nicks and small chips resulting from normal operations will be repaired on a periodic basis.

The floors in Cell 7 are sealed and bermed using angle iron and have containment trenches at every exit to the area to prevent offsite migration of spilled material. Drums stored in this area are also stored on pallets to prevent contact with spilled material in the event of a release.

4.1.4.1.2 Structural Integrity of Base

The concrete was mixed in accordance with ASTM C94/C94M, and is capable of bearing the loads associated with normal container storage and movement.

4.1.4.1.3 Containment System Capacity

Secondary containment is provided for all dangerous waste stored at the 331-C Storage Unit. Storage limits for all chemicals are listed in Table 4.1 (1988 Uniform Building Code). All floors in the bay area have sumps that have no drains and are covered with grating to prevent safety hazards. The capacity of the two sumps at the entrances to the building is 168 gallons per trench, and the sumps to the individual storage cells have a capacity of 98 gallons per sump. In addition, all floors in the bay area are coated with an epoxy based coating as described in Section 4.1.4.1.1. Inspection of the containment system to

maintain integrity is described in Chapter 6.0. Individual secondary containment systems are configured as follows:

a. Acids and Oxidizers Cell. The acids and oxidizers cell (Cell 1) is located at the northwest corner of the 331-C Storage Unit bay area. The concrete floor in this storage cell is sealed and bermed using angle iron and has a containment trench at the entrance. This trench is isolated from the other trenches in order to prevent interaction, reactions, or offsite migration of spilled materials. This provides protection even during simultaneous spills. Six cabinets, open shelving, and a large-container storage area are provided within the cell to allow storage of various sizes of containers. The containment volume of the sump entering the cell is 98 gallons. A diagram of the cell is provided in Figure 4.1.

b. Poisons and Class 9 Cell. The poisons and Class 9 cell (Cell 2) is located just south of the acids and oxidizers cell along the west wall of the bay area. The concrete floor in this storage cell is sealed and bermed using angle iron and has a containment trench at the entrance. This trench is isolated from the other trenches in order to prevent interaction, reactions, or offsite migration of spilled materials. This provides protection even during simultaneous spills. The northeast corner of the cell is used for PCB storage for disposal complying with 40 CFR 761.65(b). The containment volume of the sump entering the cell is 98 gallons. A diagram of this cell is provided in Figure 4.2.

c. Alkaline, Washington State Criteria Waste, Organic Peroxides, and Non-Regulated Waste Cell. The alkaline, Washington State Criteria waste, and non-regulated waste cell (Cell 3) is located south of the poisons and Class 9 cell on the west wall of the bay area. The concrete floor in this storage cell is sealed and bermed using angle iron and has a containment trench at the entrance. This trench is isolated from the other trenches in order to prevent interaction, reactions, or offsite migration of spilled materials. This provides protection even during simultaneous spills. Four storage cabinets, three sets of open shelving, and one explosion proof refrigerator, are positioned in the cell to allow storage of various sizes of containers. The containment volume of the sump entering the cell is 98 gallons. A diagram of this cell is provided in Figure 4.3.

d. Flammable, Organic and Compressed Aerosols Cell. The flammable cell (Cell 4) is located south of the alkaline, Washington State Criteria waste, and non-regulated waste cell. The concrete floor in this storage cell is sealed and bermed using angle iron and has a containment trench at the entrance. This trench is isolated from the other trenches in order to prevent interaction, reactions, or offsite migration of spilled materials. This provides protection even during simultaneous spills. The containment volume of the sump entering the cell is 98 gallons. A diagram of this cell is provided in Figure 4.4.

Ignitable organic waste materials are stored in this cell that also exhibits the characteristics of corrosivity and toxicity as well as reactivity. Eight Factory Mutual-approved flammable liquid storage cabinets are utilized for storage of various classes of flammable liquids as defined by the Uniform Fire Code. The capacities of the various cabinets are shown in Table 4.1. The following cabinets also are used for storage in this cell: one for combustibles, one for aerosols, two for flammable solids, and one for overflow from one of the other cabinets.

Total ignitable Waste Storage capacity of the 331-C Storage Unit bay, including the organics cell, Ignitable drum storage area, and bay storage area is limited by the following UBC restrictions for Class B occupancy:

- Class 1A flammable liquids: 120 gallons
- Class 1B flammable liquids: 240 gallons
- Class 1C flammable liquids: 360 gallons

- Maximum Class 1A, 1B, and 1C at any one time: 480 gallons
- Maximum Class 1A, 1B and 1C stored in Cell 8 self contained storage module for flammable liquids is 240 gallons
- Class 2 combustible liquids: 480 gallons
- Class 3A combustible liquids: 1320 gallons
- Combustible fibers, loose: 100 cubic feet
- Combustible fibers, baled: 1000 cubic feet
- Flammable gases in any one cylinder: 3000 cubic feet
- Liquefied flammable gases: 60 gallons

e. Flammable Liquids Storage Module. The flammable liquid storage module is a self-contained storage module (Cell 8) that allows additional storage space for flammable waste. The flammable liquid storage module is located along the south wall and is connected to the buildings fire suppression system. The flammable liquid storage module has a 2-hour fire rated containment system so that according to the Uniform Fire Code, an unlimited capacity is allowed. However, the flammable waste storage capacity of the flammable liquid storage module is limited by the 240-gallon capacity of the module's secondary containment system. No more than 240 gallons of any combination of flammable liquid classes will be stored in the module. This flammable waste storage capacity is in addition to the flammable storage limits for the bay area. A diagram showing the module location in the bay area is included in Figure 4.5.

f. Ignitable Waste Drum Storage Area. An additional section of the bay area (Cell 8) has been dedicated with two flammable drum storage cabinets used to store drum quantities of ignitable waste before offsite shipment. The bay area is bordered on all sides by angle iron (3½ in. x 6 in.) bolted to the floor and sealed to provide secondary containment. To further enhance containment and to allow greater storage capacity, the drums stored in this area are stored in flammable liquid drum storage cabinets.

Maximum storage in these two cabinets is approximately four 55-gallon drums and twelve five-gallon drums. A diagram showing the two flammable storage cabinets in the bay area is included in Figure 4.5. Additional ignitable waste storage is provided for in Cell 4, the organics cell, and in the flammable liquids storage module. All of this ignitable waste storage is provided for utilizing flammable liquid storage cabinets for added safety.

g. Universal and Recycling Waste Storage Area. A section of the bay (Cell 6) has been dedicated to storage of drum quantities of universal and recycling waste before shipment. The area is approximately 20 ft. x 5 ft. in size dependent on the amounts in storage. All material in this area is stored in DOT approved containers and is stored on pallets to prevent contact with spilled waste in the event of an incident. A diagram of this area is included in Figure 4.5.

h. Bay Storage Area. The bay storage area is itself a secondary containment area for loading, unloading, and the storage of dangerous waste. All floors in the bay area are bordered on all sides by angle iron (3½ in. x 6 in.) bolted to the floor and sealed with an epoxy based coating to provide secondary containment. Sump locations are indicated in Figure 4.5.

Due to space limitations in the individual cells, and for ease of mechanical handling, the bay floor is typically used for storage of chemicals in drums.

The bay floor is also used to store lab packs and bulked waste containers before offsite shipment to permitted treatment, disposal, or recycling facilities. Generally, only corrosives, oxidizers, toxic organic solvent mixtures (typically halogenated solvents), antifreeze mixtures, contaminated water which is toxic

dangerous waste, nonliquid waste, Class 9, or state-only dangerous waste materials are stored in the bay storage area.

If incompatible wastes are stored in the bay area, they are kept in individual secondary containment systems (spill pallets, portable booms or other commercially available drum containment systems) if in bulk drum form. If the waste is in labpack form, it will meet WAC 173-303-161, *Overpacked containers (labpacks)*, requirements before being stored in the bay area. The DOT approved outer container serves as the secondary containment system for segregation in case of simultaneous accidental spillage.

The bay storage is governed by the building occupancy limits of Table 4.2, which includes the inventory of the individual storage cells previously described. In order to provide additional separation from spilled liquids and for ease of handling, all drums stored on the bay floor are stored on pallets. A diagram of the bay area is provided in Figure 4.5.

i. Explosives Storage Area. Due to Uniform Building Code restrictions, waste classified as explosive by DOT regulations are stored in a 3 ft. x 3 ft. x 3 ft. explosives magazine, with an 8 cubic foot interior, outside Cell 4. The magazine is constructed of steel and certified to have been fabricated per Institute of Makers of Explosives (IME) SLP22, type 2-day box requirements. No more than 1 pound of explosives is stored in the magazine at one time. The location of the magazine is indicated in Figure 4.5.

4.1.4.1.4 Control of Run-On

The 331-C Storage Unit was designed to eliminate the likelihood of on-site, or for that matter, off-site migration via run-on and run-off. The building and the covered area adjacent to the building have been constructed upon a foundation and the surrounding soil sloped away so that precipitation cannot cause either run-on or run-off problems.

4.1.4.2 Removal of Liquids from Containment System

Upon discovery of liquid accumulation in the containment resulting from a spill or other release, the Building Emergency Director (BED) must be contacted in accordance with the 331-C Storage Unit Building Emergency Procedure (BEP) Chapter 7.0. The BED may determine that the contingency plan should be implemented. If the incident is minor, and the BED approves, removal of the liquids will commence immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; a PNNL industrial hygienist may be contacted to determine appropriate personnel protection requirements and any other safety requirements that may be required, such as chemical testing or air monitoring. In addition, ventilation of the spill-impacted area may be performed if determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Spills are normally contained either within the storage cabinet, within the cell, or within a secondary containment trench or berm as described in Section 4.1.4.1.1. In any case, spilled material will be recovered to the extent possible by pumping recovered liquids with a pump made of non-reactive materials (either steel or PVC) to intact containers selected in accordance with the container criteria in WAC 173-303-190. Non-recoverable liquids will be absorbed with an appropriate absorbent (after appropriate chemical reaction to neutralize reactivity in the case of reactive waste, or neutralization in the case of corrosive materials); refer to Table 6.2 for a list of available materials for this purpose. The absorbent material will then be recovered and placed in a container selected in accordance with Section 4.1.1.1, using non-sparking shovels in the case of ignitable waste. The floor, cabinets and any other impacted containers may be cleaned with dry rags, soap and water, or a compatible solvent if necessary to remove external contamination. Contaminated rags and other cleanup material will be disposed of in an appropriate manner.

4.1.5 Demonstration that Containment Is Not Required Because Containers Do Not Contain Free Liquids, Wastes That Exhibit Ignitability or Reactivity, or Wastes Designated F020-F023, F026, or F027

This section is not applicable to the 331-C Storage Unit because the storage area is used to store containers both with and without free liquids. The 331-C Storage Unit does not meet the conditions for reduced requirements for storing only containers without free liquid; therefore, the facility is subject to the full requirements for containment.

4.1.6 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste in Containers

The following sections provide information on the management of ignitable, reactive, and incompatible waste in containers. Additional information on this subject can be found in Chapter 6.0, Section 6.5.

4.1.6.1 Management of Certain Reactive Wastes in Containers

Wastes described in WAC 173-303-070(7)(vi), (vii), and/or (viii) (explosive type wastes) will be stored in the explosives magazine described in Section 4.1.4.1.3 above. This magazine meets the Uniform Fire Code requirements for storage of such materials.

4.1.6.2 Management of Ignitable or Reactive Waste in Containers

Ignitable and reactive wastes are stored in compliance with Uniform Fire Code Division II regulations for Container and Portable Tank Storage Inside Buildings (International Conference of Building Officials 1988). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the storage cells.

4.1.6.3 Design of Areas to Manage Incompatible Wastes

Chapter 6.0, Section 6.5.2 describes guidelines used at the 331-C Storage Unit to determine the compatibility of dangerous waste so that incompatible wastes are not stored together. Chemical waste stored in the 331-C Storage Unit are separated by compatibility, chemical makeup, and hazard class and stored in areas having appropriate secondary containment, as described in Section 4.1.1.6.

As shown in Figures 4.1 through 4.5, each storage area has individual storage configurations; secondary containment structures are provided to verify that incompatible materials will not commingle if spilled. Further segregation is provided by chemical storage cabinets located throughout the facility in various areas as shown in Figures 4.1 through 4.5. Cabinet types are noted in those figures and capacities are described in Table 4.1. Incompatible wastes are never placed in the same container, or in unwashed containers that previously held incompatible waste.

Compliance with WAC 173-303-395(1)(b) is assured utilizing the reactivity groupings given in *A Method for Determining the Compatibility of Hazardous Waste* (EPA 1980). Using this system and following the guidelines for handling ignitable or reactive waste and mixing of incompatible waste, as described in Section 6.5.2, fulfills the requirements of WAC 173-303-395(1)(c).

4.2 TANK SYSTEMS

This section is not applicable to the 331-C Storage Unit because waste is not managed in tanks.

4.3 WASTE PILES

This section is not applicable to the 331-C Storage Unit because waste is not managed in waste piles.

4.4 SURFACE IMPOUNDMENTS

This section is not applicable to the 331-C Storage Unit because waste is not placed in surface impoundments.

4.5 INCINERATORS

This section is not applicable to the 331-C Storage Unit because waste is not incinerated.

4.6 LANDFILLS

This section is not applicable to the 331-C Storage Unit because waste is not placed in landfills.

4.7 LAND TREATMENT

This section is not applicable to the 331-C Storage Unit because waste is not treated in land treatment units.

4.8 AIR EMISSIONS CONTROL

4.8.1 Process Vents

This section is not applicable to the 331-C Storage Unit, as no equipment subject to WAC 173-303-690 (Subpart AA requirements) is located or utilized at the unit.

4.8.2 Equipment Leaks

This section is not applicable to the 331-C Storage Unit, as no equipment subject to WAC 173-303-691 (Subpart BB requirements) is located or utilized at the unit. Note that pumps or other equipment may contact hazardous waste with an organic concentration of at least ten percent by weight for less than 300 hours per calendar year. If so, the equipment will be identified as required by WAC 173-303-691(1)(f).

4.8.3 Tanks and Containers

4.8.3.1 Applicability of Subpart CC Standards

The requirements of WAC 173-303-692 (Subpart CC standards) apply to dangerous waste stored at the 331-C Storage Unit unless one or more of the exceptions given at WAC 173-303-692(1)(b) apply.

4.8.3.2 Tank Systems and Container Areas – Demonstrating Compliance

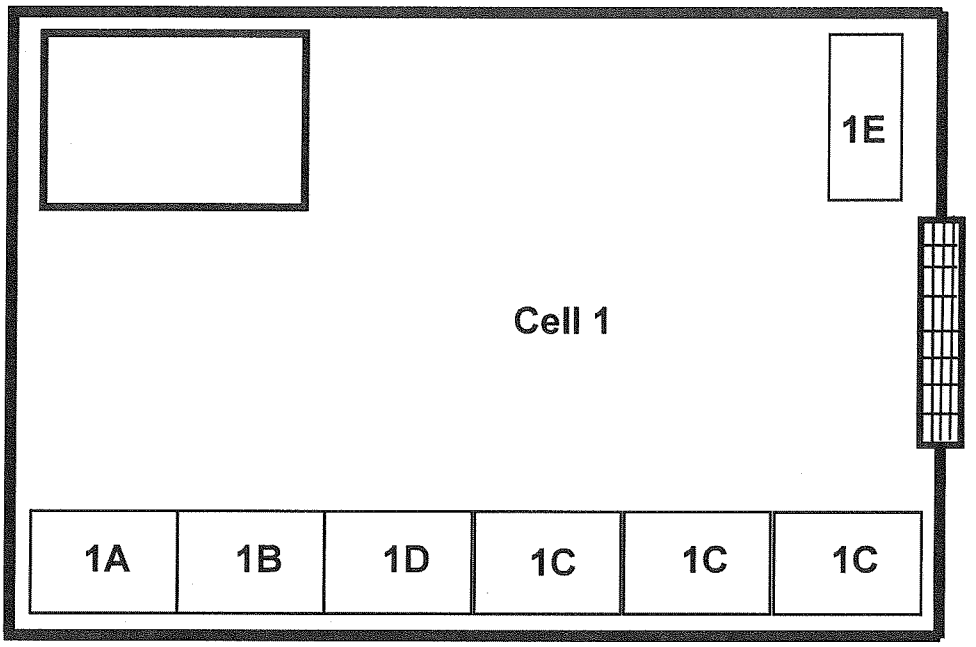
Compliance with the Subpart CC standards is maintained at the 331-C Storage Unit by utilizing DOT-specification containers for storage, when the container has a design capacity greater than 0.1 m^3 (26.4 gallons). Containers greater than 0.46 m^3 (121 gallons) are not typically utilized at 331-C, and if they are, they would be used only for materials with low vapor pressures. Hence Level 1 container standards are the only standards that must be met.

To meet the Level 1 standards, the following standards are observed:

- Opening hazardous waste containers only occurs when adding or removing waste, or for necessary inspection or sampling, after which the container is promptly re-closed.
- Inspection of the closure of hazardous waste containers is checked prior to loading for shipment to 331-C as part of the waste acceptance process (Section 3.2.2).
- Any waste container greater than 0.1 m^3 capacity stored longer than one year is re-inspected at least once every 12 months to check the container for deterioration or damage. Any deterioration or damage is documented and promptly repaired in accordance with 40 CFR 264.1086(c)(4)(iii).

Determination that containers with capacity greater than 0.46 m^3 (121 gallons) are not in "light material service" is provided through the acceptance criteria in the 331-C waste analysis plan (Section 3.2).

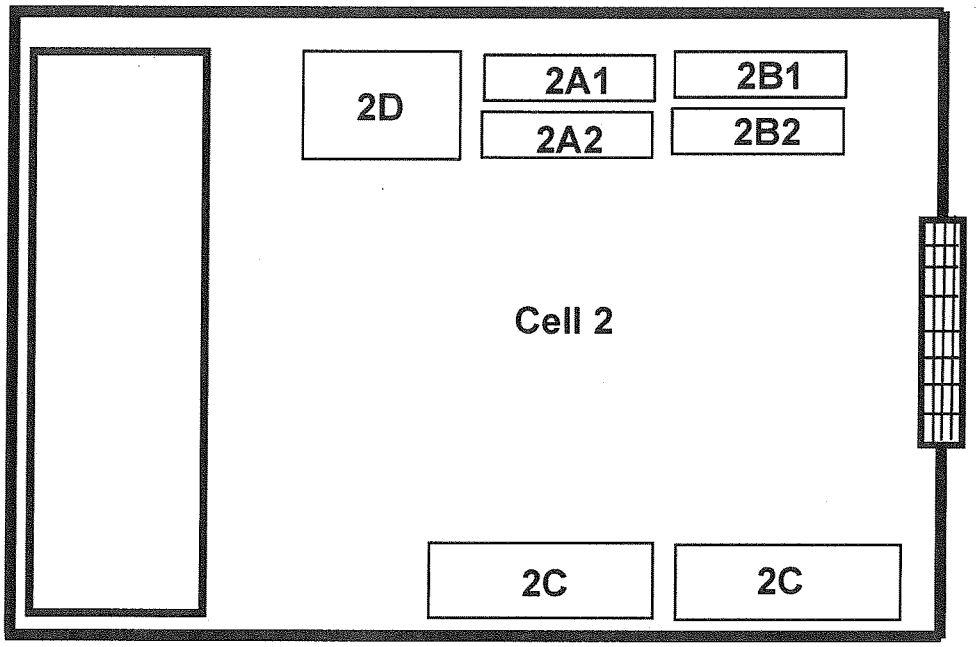
Figure 4.1. Acids and Oxidizers Cell



Legend

1A	Liquid Oxidizers (Medium Cabinet)
1B	Solid Oxidizers (Small Cabinet)
1C	Inorganic Acids (Medium Cabinet)
1D	Organic Acids (corrosive) (Small Cabinet)
1E	Mercury/Corrosive Solids (Small Shelf)
▮	Epoxy coated angle iron
▦	Collection Sump
▢	Drum and Carboy Storage Area

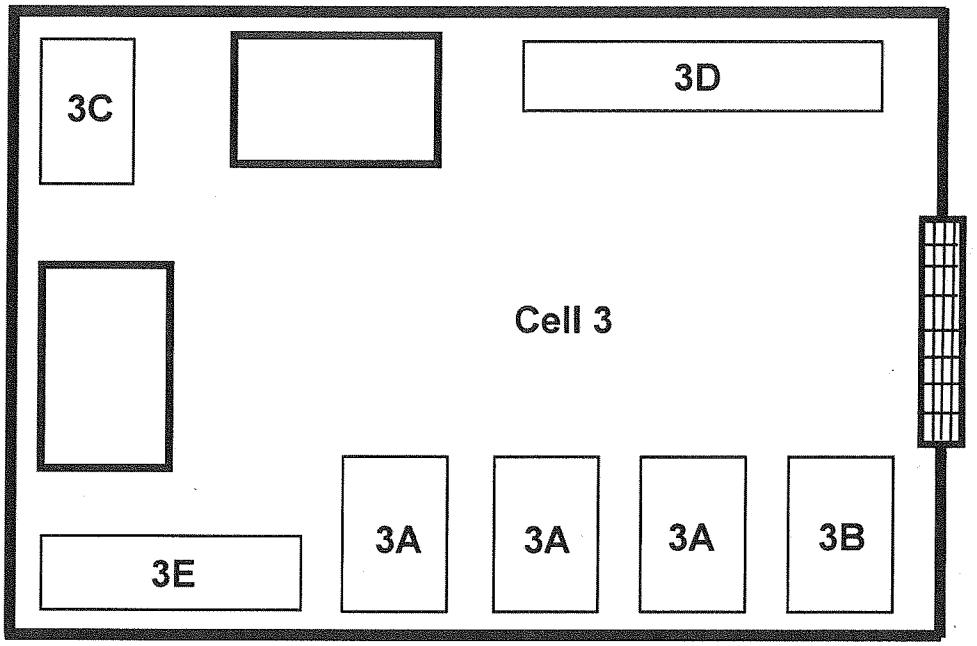
Figure 4.2. Poisons and Class 9 Cell



Legend

2A1	Poisons, Acidic (P.G.II and P.G.III) (Small Cabinet)
2A2	Poisons, Neutral/Basic (P.G.II and P.G.III) (Small Cabinet)
2B1	Poisons, Neutral/Basic (P.G.I) (Small Cabinet)
2B2	Poisons, Acidic (P.G.I) (Small Cabinet)
2C	Class 9 (nonreactive) (Large and Small Shelf)
2D	Class 9 (reactives) (Large Cabinet)
▮	Epoxy coated angle iron
▦	Collection Sump
▯	Drum and Carboy Storage Area

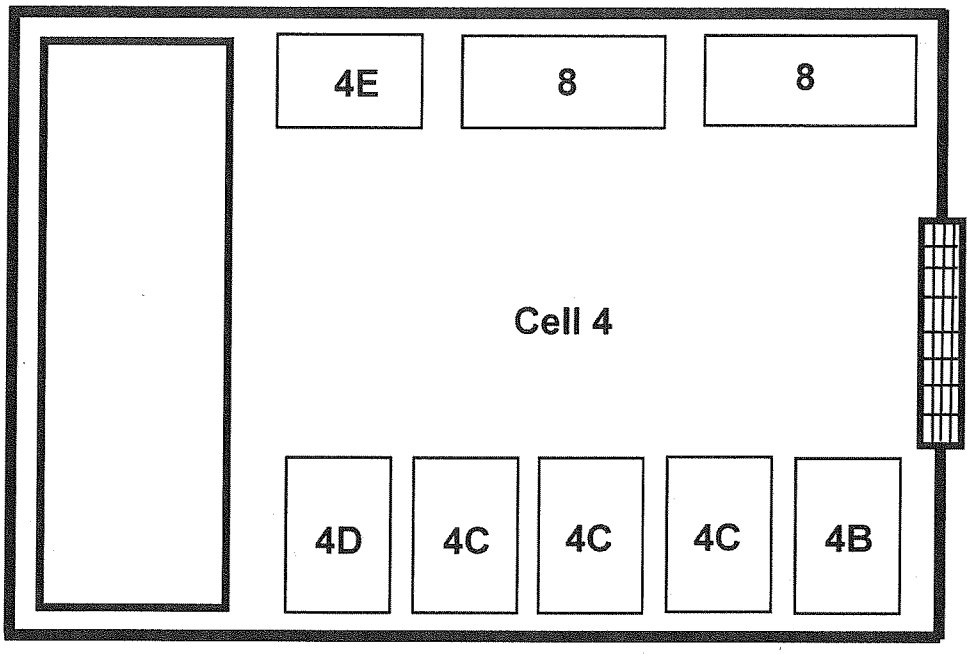
Figure 4.3. Alkaline, Washington State Criteria Waste, Organic Peroxides, and Non-Regulated Waste Cell



Legend

3A	Alkaline (liquids and solids) (Medium Cabinet)
3B	Alkaline/Oxidizers (Medium Cabinet)
3C	Organic Peroxides and temperature sensitive (refrigerator)
3D	Washington State Criteria Waste (Large Shelve)
3E	Non-Regulated Liquids/Solids (Small Shelf)
▮	Epoxy coated angle iron
▦	Collection Sump
▯	Drum and Carboy Storage Area

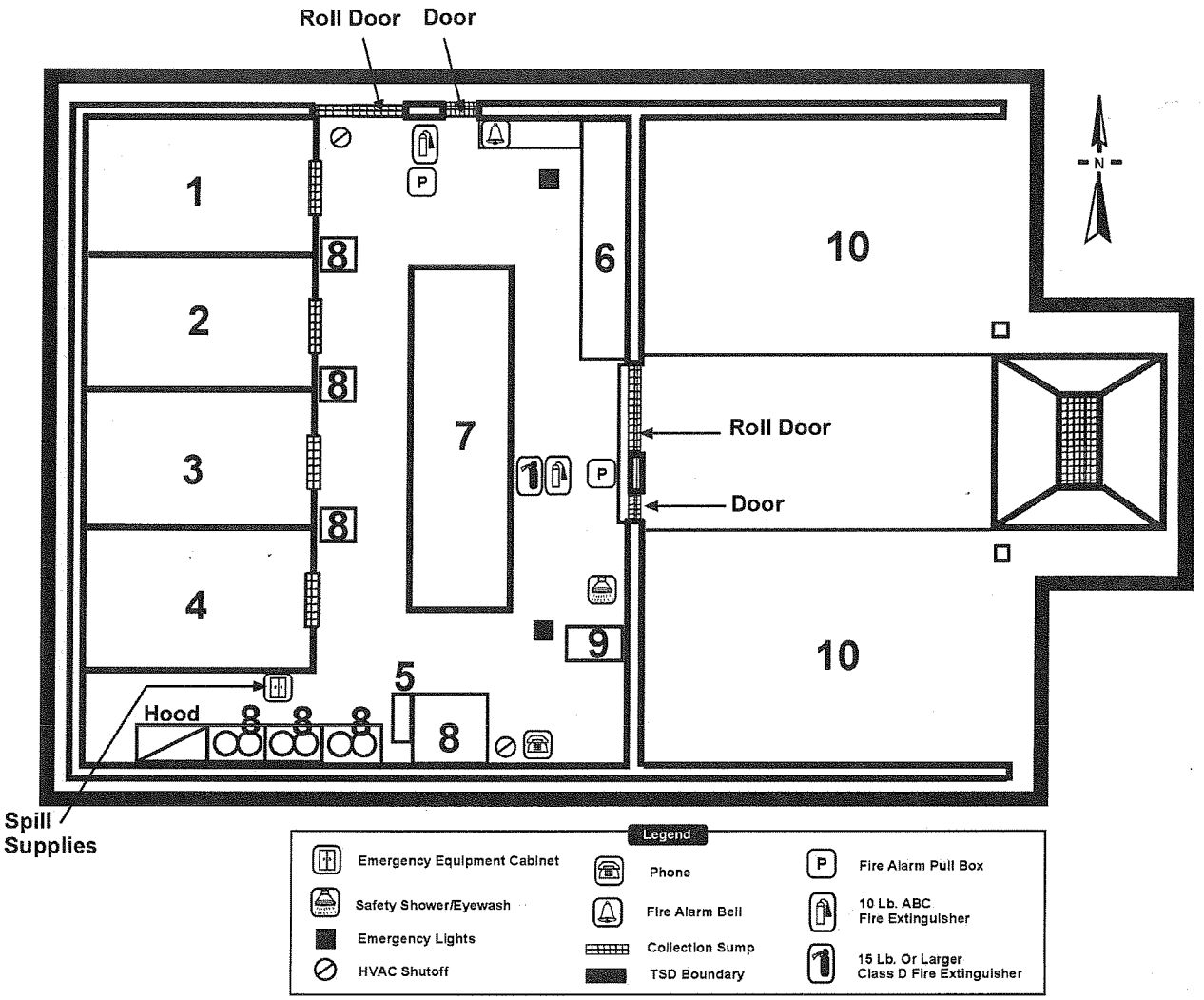
Figure 4.4. Flammable, Organic and Compressed Aerosols Cell



Legend

4B	Aerosols (Large Cabinet)
4C	Flammable Liquids (Large Cabinet)
4D	Flammable Solids (Dangerous When Wet) (Large Cabinet)
4E	Flammable Solids (with water Spontaneously Combustible) (Large Cabinet)
4F	Floating Cabinet (Large Cabinet)
8	Flammable Liquids (Large Cabinets)
▮	Epoxy coated angle iron
▦	Collection Sump
☐	Drum and Carboy Storage Area

Figure 4.5. Bay Storage Area



Legend

1. Acids, Oxidizers
2. Poisons, Class 9
3. Alkaline, WSDW, Organic Peroxides
4. Organics Flammable and Compressed Aerosols
5. Compressed gases
6. Universal/Recycling Storage Area
7. Class 9, WSDW, Non-flammable and compatible waste
8. Flammable Storage
9. Explosive Magazine
10. Outdoor Storage

1 **Table 4.1. Storage Devices Used at the 331-C Storage Unit**

Storage Device	Typical Use	Approximate External Dimensions (in.)	Approximate Capacity (gal/ft3.)
Small Cabinet	Storage of containers (5 gallons or less capacity)	43w x 18d x 65h	50 max
Medium Cabinet	Storage of containers (18.93 liter [5 gallons] or less capacity	31w x 31d x 65h	60 max
Large Cabinet	Storage of containers (5 gallons or less capacity)	34w x 34d x 65h	80 max
Small Drum Cabinet	Storage of drums (5 to 55 gallons capacity)	34w x 34d x 65h	65 max
Large Drum Cabinet	Storage of drums (5 to 55 gallons capacity)	59w x 34d x 65h	130 max
Small Shelving	Storage of containers (5 gallons or less capacity)	47w x 18d x 62h	65 max
Large Shelving	Storage of containers (5 gallons or less capacity)	72w x 18d x 62h	100 max
Flammable Storage Module	18.93 liter [5 gallons] to 208.18 liter [55 gallons] capacity	78w x 73d x 100h	240 max
Refrigerator/ Freezer	Storage of containers of organic peroxides and other temperature sensitive waste	34w x 29d x 67h	25 Cu.Ft.
Explosives Magazine	Storage of containers containing DOT classified explosives	36w x 36d x 36h	8 Cu.Ft.

1

Table 4.2. Building Occupancy limits.

TABLE NO.9-A—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS, LIQUIDS AND CHEMICALS REPRESENTING A PSYICAL HAZARD BASIC QUANTITIES PER CONTROL AREA[1]

When two units are given values within parentheses are in cubic feet (Cu.Ft.) or pounds (Lbs.)

CONDITION		STORAGE[2]			USE[2]–CLOSED SYSTEMS			USE[2]–OPEN SYSTEMS		
MATERIAL	CLASS	Solid Lbs. (Cu.Ft.)	Liquid Gallons (Lbs.)	Gas (Cu.Ft.)	Solid Lbs. (Cu.Ft.)	Liquid Gallons (Lbs.)	Gas (Cu.Ft.)	Solid Lbs. (Cu.Ft.)	Liquid Gallons (Lbs.)	Gas (Cu.Ft.)
1.1 Combustible liquid[3]	II	–	120[4 5]	–	–	120[4]	–	–	30[4]	–
	III-A	–	330[4 5]	–	–	330[4]	–	–	80[4]	–
	III-B	–	13,200[5 6]	–	–	13,200[6]	–	–	3,300[6]	–
1.2 Combustible dust lbs./1000 Cu.Ft.		1[7]	–	–	1[7]	–	–	1[7]	–	–
1.3 Combustible fiber			–	–		–	–		–	–
(loose)		(100)			(100)			(20)		
(baled)		(1,000)			(1,000)			(200)		
1.4 Cryogenic, flammable or oxidizing			45	–	–	45	–	–	10	–
2.1 Explosives		1[5 8 9]	(1)[5 8 9]	–	¼[8]	(¼)[8]	–	¼[8]	(¼)[8]	–
3.1 Flammable solid		125[4 5]	–	–	25[4]	–	–	25[4]	–	–
3.2 Flammable gas										–
(gaseous)		–	–	750[4 5]	–	–	750[4 5]	–	–	–
(liquefied)		–	15[4 5]	–	–	15[4 5]	–	–	–	
3.1 Flammable liquid[3]		–	30[4 5]	–	–	30[4]	–	–	10[4]	–
		–	60[4 5]	–	–	60[4]	–	–	15[4]	–
		–	90[4 5]	–	–	90[4]	–	–	20[4]	–
Combination I-A, I-B, I-C		–	120[4 5 10]	–	–	120[4 10]	–	–	30[4 10]	–
4.1 Organic peroxide, unclassified detonable		1[5 8]	(1)[5 8]	–	¼[8]	(¼)[8]		¼[8]	(¼)[8]	–
4.2 Organic peroxide	I	5[4 5]	(5)[4 5]	–	(1)[4]	(1)[4]	–	1[4]	1[4]	–
	II	50[4 5]	(50)[4 5]	–	50[4]	(50)[4]	–	10[4]	(10)[4]	–
	III	125[4 5]	(125)[4 5]	–	125[4]	(125)[4]	–	25[4]	(25)[4]	–
	IV	500	(500)	–	500[4]	(500)	–	100	(100)	–
	V	N.L.	N.L.	–	N.L.	N.L.	–	N.L.	N.L.	–
4.3 Oxidizer	4	1[5 8]	(1)[5 8]	–	¼[8]	(¼)[8]	–	¼[8]	(¼)[8]	–
	3	10[4 5]	(10)[4 5]	–	2[4]	(2)[4]	–	2[4]	(2)[4]	–
	2	250[4 5]	(250)[4 5]	–	250[4]	(250)[4]	–	50[4]	(50)[4]	–
	1	1,000[4 5]	(1,000)[45]	–	1,000[4]	(1,000)[4]	–	200[4]	(200)[4]	–
4.1 Oxidizer—Gas										
(gaseous)		–	–	1,500[4 5]	–	–	1,500[4 5]	–	–	–
(liquefied)		–	15[4 5]	–	–	15[4 5]	–	–	–	–
5.1 Pyrophoric		4[5 8]	(4)[5 8]	50[5 8]	1[8]	(1)[8]	10[5 8]	0	0	0
6.1 Unstable (reactive)	4	1[5 8]	(1)[5 8]	10[5 8]	¼[8]	(¼)[8]	2[5 8]	¼[8]	(¼)[8]	0
	3	5[4 5]	(5)[4 5]	50[4 5]	1[4]	(1)[4]	10[4 5]	1[4]	(1)[4]	0
	2	50[4 5]	(50)[4 5]	250[4 5]	50[4]	(50)[4]	250[4 5]	10[4]	(10)[4]	0
	1	125[4 5]	(125)[4 5]	750[4 5]	125[4]	(125)[4]	750[4 5]	25[4]	(25)[4]	0
7.1 Water (reactive)	3	5[4 5]	(5)[4 5]	–	5[4]	(5)[4]	–	1[4]	(1)[4]	–
	2	50[4 5]	(50)[4 5]	–	50[4]	(50)[4]	–	10[4]	(10)[4]	–
	1	125[5 6]	(125)[5 6]	–	125[6]	(125)[5 6]	–	25[6]	(25)[6]	–

N.L. = Not Limited
[1] Control area is a space bounded by not less than a one-hour fire-resistive occupancy separation within which the exempted amounts of hazardous materials may be stored dispensed, handled or used. The number of control areas within a building used for retail and wholesale stores shall not exceed two. The number of control areas in buildings with other uses shall not exceed four.
[2] The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
[3] The quantities of alcoholic beverages in retail sales uses are unlimited provided the liquids are packaged in individual containers not exceeding four liters.
The quantities of medicines, foodstuffs and cosmetics containing not more than 50 percent of volume of water-miscible liquids and with the remainder of the solutions not being flammable in retail sales or storage occupancies are unlimited when packaged in individual containers not exceeding four liters.
[4] Quantities may be increased 100 percent in sprinklered buildings. When Footnote 5 also applies, the increase for both footnotes may be applied.
[5] Quantities may be increased 100 percent when stored in approved storage cabinets or safety cans as specified in the fire code. When Footnote 4 also applies, the increase for both may be applied.
[6] The quantities permitted in a sprinklered building are not limited.
[7] A dust explosion potential is considered to exist if 1 pound or more of combustible dust per 1,000 cubic feet of volume is normally in suspension or on horizontal surfaces inside buildings or equipment and which could be put into suspension by an accident, sudden force or small explosion.
[8] Permitted in sprinklered buildings only. None is allowed in unsprinklered buildings.
[9] One pound of black sporting powder and 20 pounds of smokeless powder are permitted in sprinklered or unsprinklered buildings.
[10] Containing not more than the exempt amounts of Class I-A, Class I-B, and Class I-C flammable liquids.

TABLE NO.9-B—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS, LIQUIDS AND CHEMICALS REPRESENTING A HEALTH HAZARD MAXIMUM QUALTITIES PER CONTROL AREA [1 2]

When two units are given, values within parentheses are in pounds (Lbs)

	STORAGE[3]			USE[3]–CLOSED SYSTEMS			USE[3]–OPEN SYSTEMS		
MATERIAL	Solid Lbs. (Cu.Ft.)[5 6]	Liquid Gallons[5 6] (Lbs.)	Gas (Cu.Ft.)[5]	Solid (Lbs.)[5]	Liquid Gallons[5] (Lbs.)	Gas (Cu.Ft.)	Solid (Lbs.)[5]	Liquid Gallons[5] (Lbs.)	Gas (Cu.Ft.)
1. Corrosives	5,000	500	650[6]	5,000	500	650[5]	1,000	100	–
2. Highly Toxics[1]	1	(1)	20[7]	1	(1)	20[7]	(¼)	(¼)	–
3. Irritants	5,000	500	650[6]	5,000	500	650[5]	1,000	100	
4. Sensitizers	5,000	500	650[6]	5,000	500	650[5]	1,000	100	
5. Other Health Hazards	5,000	500	650[6]	5,000	500	650[5]	1,000	100	

[1] Control area is a space bounded by not less than a one-hour fire-resistive occupancy separation within which the exempted amounts of hazardous materials may be stored dispensed, handled or used. The number of control areas within a building used for retail and wholesale stores shall not exceed two. The number of control areas in buildings with other uses shall not exceed four.
[2]The quantities of medicines, foodstuffs and cosmetics containing not more than 50 percent of volume of water-miscible liquids and with the remainder of the solutions not being flammable in retail sales or storage occupancies are unlimited when packaged in individual containers not exceeding four liters.
[3]The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
[4]For carcinogenic and radioactive materials, see the Fire Code.
[5]Quantities may be increased 100 percent in sprinklered buildings. When Footnote 6 also applies, the increase for both footnotes may be applied.
[6] Quantities may be increased 100 percent when stored in approved storage cabinets or safety cans as specified in the fire code. When Footnote 5 also applies, the increase for both may be applied.
[7]Permitted only when stored in approved exhaust gas cabinets, exhausted enclosures or fume hoods.
[8]For special provisions, see the Fire Code.

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